



Test Report Serial Number:

45461952 r1.0

Test Report Date:

26 July 2024

Project Number:

1659

## EMC Test Report - New Certification

Applicant:



Garmin International Inc.  
1200 East 151 St  
Olathe, KS, 66062  
USA

FCC ID:

IPH-04861

Product Model Number / HVIN

A04861

Product Marketing Name / PMN

A04861

In Accordance With:

**CFR Title 47, Part 15 Subpart C, (§15.225), Part 15 Subpart B**

Part 15 Low Power Communication Device Transmitter (DXX)

Approved By:

**Ben Hewson, President**

Celltech Labs Inc.  
21-364 Lougheed Rd.  
Kelowna, BC, V1X 7R8  
Canada



Test Lab Certificate: 2470.01



Industry  
Canada

IC Registration 3874A



FCC Registration: CA3874

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## 1.0 DOCUMENT CONTROL

| Revision History    |                         |                  |                        |            |                         |
|---------------------|-------------------------|------------------|------------------------|------------|-------------------------|
| Samples Tested By:  |                         | Art Voss, P.Eng. | Date(s) of Evaluation: |            | 18 June - 19 July, 2024 |
| Report Prepared By: |                         | Art Voss, P.Eng. | Report Reviewed By:    |            | Ben Hewson              |
| Report Revision     | Description of Revision |                  | Revised Section        | Revised By | Revision Date           |
| 0.1                 | Draft                   |                  | n/a                    | Art Voss   | 15 July 2024            |
| 1.0                 | Initial Release         |                  | n/a                    | Art Voss   | 26 July 2024            |

## 2.0 CLIENT AND DUT INFORMATION

| Client Information                    |                                                                          |
|---------------------------------------|--------------------------------------------------------------------------|
| Applicant Name                        | Garmin International Inc.                                                |
| Applicant Address                     | 1200 East 151 St                                                         |
|                                       | Olathe, KS, 66062                                                        |
|                                       | USA                                                                      |
| DUT Information                       |                                                                          |
| Device Identifier(s):                 | FCC ID: <b>IPH-04861</b>                                                 |
| Device Model(s) / HVIN:               | A04861                                                                   |
| Device Marketing Name / PMN:          | A04861                                                                   |
| Test Sample Serial No.:               | 3469058597 - Conducted, 3469058595 - OTA                                 |
| Device Type:                          | Portable Transceiver                                                     |
| Equipment Class:                      | Digital Transmission Systems (DTS)                                       |
|                                       | Spread Spectrum Transmitter (DSS)                                        |
|                                       | Low Power Communication Device (DTS)                                     |
|                                       | Global Navigation Satellite System (GNSS) Receivers                      |
|                                       | NFC - Low Power Communication Device Transmitter (DXX)                   |
| Transmit Frequency Range:             | WiFi (DTS): 2412-2472MHz                                                 |
|                                       | BT/BLE/ANT: 2402-2480MHz                                                 |
|                                       | NFC: 13.56MHz                                                            |
| Manuf. Max. Rated Output Power:       | WiFi - Digital Transmission System (DTS): 11dBm EIRP                     |
|                                       | BlueTooth - Spread Spectrum Transmitter (DSS): -4.8dBm EIRP              |
|                                       | BLE/ANT - Low Power Communication Device Transmitter (DTS): -3.7dBm EIRP |
|                                       | NFC - Low Power Communication Device Transmitter (DXX): 46.5dBuV/m       |
| Antenna Type and Gain:                | -5.8dBi Max Slot Antenna                                                 |
| Modulation:                           | WiFi: DSSS, OFDM, CCK, MCS0-7                                            |
|                                       | BT BR: GFSK                                                              |
|                                       | BT EDR: Pi/4-DQPSK, 8DPSK                                                |
|                                       | BLE: GMSK                                                                |
|                                       | ANT: GFSK                                                                |
|                                       | NFC: ASK                                                                 |
| DUT Power Source:                     | 4.5VDC Rechargeable Li-Ion                                               |
| DUT Dimensions [LxWxH]                | H x W x D: 47mm dia x 4.5mm                                              |
| Deviation(s) from standard/procedure: | None                                                                     |
| Modification of DUT:                  | None                                                                     |

### 3.0 SCOPE

#### Preface:

This Certification Report was prepared on behalf of:

**Garmin International Inc.**

,(the '*Applicant*'), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

#### Device:

The Garmin Model/HVIN: A04861 is a portable transceiver device consisting of a WiFi, BlueTooth (BT), BlueTooth Low Energy (BLE), Adaptive Network Topology (ANT) and Near Field Communication (NFC) transceivers. The WiFi and BT/BLE/ANT transceivers share the same antenna and cannot simultaneously transmit.

#### Requirement:

The transceivers of this *equipment* are subject to emissions evaluation in accordance with FCC: 47 CFR 2, 15C. As per FCC 47 CFR §2.1093, an RF Exposure (SAR) evaluation is required for this *Equipment* and the results of the RF Exposure (SAR) evaluation appear in a separate report.

#### Application:

This is an application for a New Certification.

#### Scope:

The scope of this investigation is limited to the evaluation and reporting of the wanted and spurious emissions in accordance with the rule parts cited in Normative References section of this report.

#### 4.0 TEST RESULT SUMMARY

| TEST SUMMARY |                                |                                       |                             |              |        |
|--------------|--------------------------------|---------------------------------------|-----------------------------|--------------|--------|
| Section      | Description of Test            | Procedure Reference                   | Applicable Rule Part(s) FCC | Test Date    | Result |
| 7.0          | Occupied Bandwidth             | ANSI C63.10-2013<br>KDB 558074 D01v05 | §2.1049                     | 17 July 2024 | Pass   |
| 8.0          | NFC Field Strength, Mask       | ANSI C63.10-2013<br>KDB 558074 D01v05 | §15.225(a)(c )              | 17 July 2024 | Pass   |
| 9.0          | Radiated Tx Emission           | ANSI C63.10-2013<br>KDB 558074 D01v05 | §15.249(d)(e)<br>§15.209    | 17 July 2024 | Pass   |
| 10.0         | Radiated Rx Emissions          | ANSI C63.10-2013<br>KDB 558074 D01v05 | §15.249(d)(e)<br>§15.209    | 17 July 2024 | Pass   |
| 11.0         | Power Line Conducted Emissions | ANSI C63.4-2014                       | §15.107                     | 18 July 2024 | Pass   |
| 12.0         | Frequency Stability            | ANSI C63.10-2013<br>KDB 558074 D01v05 | §15.225                     | 19 July 2024 | Pass   |

| Test Station Day Log |                   |                       |                           |              |                            |
|----------------------|-------------------|-----------------------|---------------------------|--------------|----------------------------|
| Date                 | Ambient Temp (°C) | Relative Humidity (%) | Barometric Pressure (kPa) | Test Station | Tests Performed Section(s) |
| 17 July 2024         | 27.0              | 21                    | 101.5                     | OATS         | 7, 8, 9,, 10               |
| 18 July 2024         | 20.0              | 16                    | 101.2                     | LISN         | 11                         |
| 19 July 2024         | 22.6              | 18                    | 100.8                     | TC           | 12                         |

**EMC** - EMC Test Bench  
**OATS** - Open Area Test Site  
**LISN** - LISN Test Area  
**IMM** - Immunity Test Area

**SAC** - Semi-Anechoic Chamber  
**TC** - Temperature Chamber  
**ESD** - ESD Test Bench  
**RI** - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.



Art Voss, P.Eng.  
 Technical Manager  
 Celltech Labs Inc.

17 July 2024  
 Date



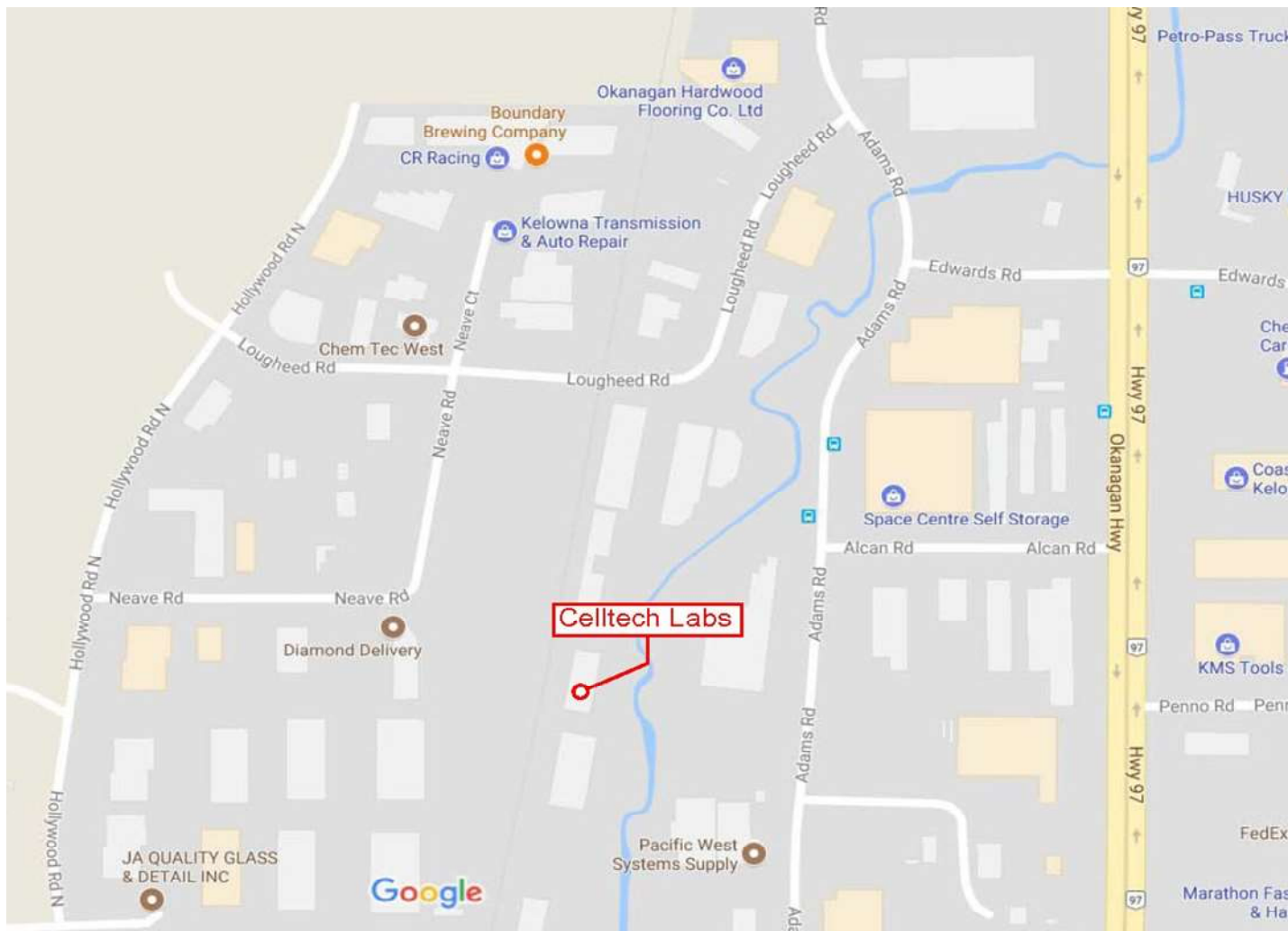
## 5.0 NORMATIVE REFERENCES

| Normative References |                                                                                                                                                                               |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ISO/IEC 17025:2017   | General requirements for the competence of testing and calibration laboratories                                                                                               |
| ANSI C63.4-2014      | American National Standard of Procedures for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electric and Electronic Equipment in the Range of 9kHz to 40GHz |
| ANSI C63.10-2013     | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices                                                                                |
| CFR                  | Code of Federal Regulations<br>Title 47: Telecommunication<br>Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations                           |
| CFR                  | Code of Federal Regulations<br>Title 47: Telecommunication<br>Part 15: Radio Frequency Devices<br>Subpart B: Unintentional Radiators                                          |
| CFR                  | Code of Federal Regulations<br>Title 47: Telecommunication<br>Part 15: Radio Frequency Devices<br>Sub Part C (15.225) Intentional Radiators                                   |

## 6.0 FACILITIES AND ACCREDITATIONS

### Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874 and Industry Canada under Test Site File Number IC 3874A. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



## 7.0 OCCUPIED BANDWIDTH

### Test Procedure

|           |                                           |
|-----------|-------------------------------------------|
| Normative | FCC 47 CFR §2.1046, §15.225               |
| Reference | KDB 558074 (8.3.2.1), ANSI C63.10 (6.9.3) |

### General Procedure

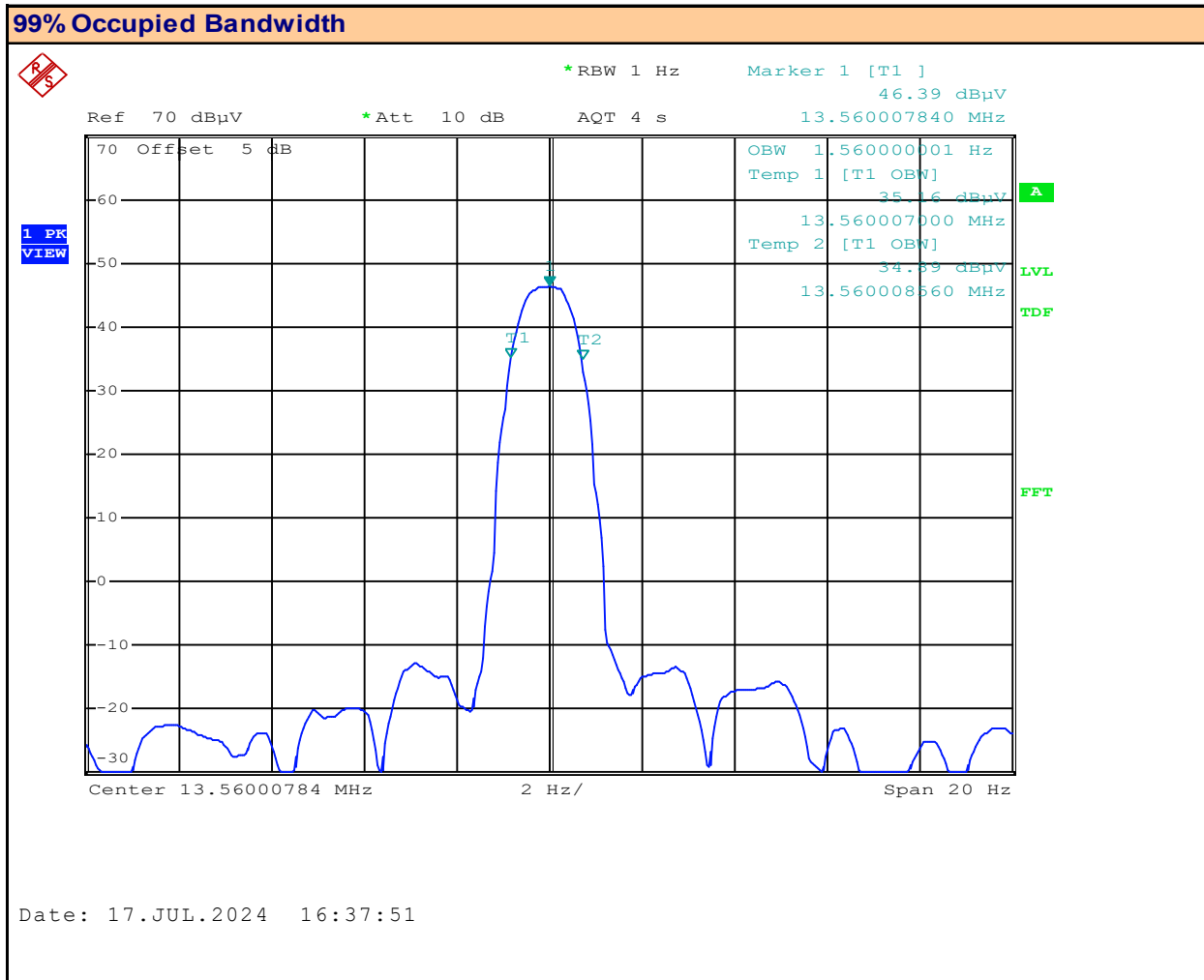
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C63.10 (6.9.3) | <p><b>6.9.3 Occupied bandwidth—power bandwidth (99%) measurement procedure</b></p> <p>The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:</p> <ul style="list-style-type: none"> <li>a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.</li> <li>b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.</li> <li>c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than <math>[10 \log (OBW/RBW)]</math> below the reference level. Specific guidance is given in 4.1.5.2.</li> <li>d) Step a) through step c) might require iteration to adjust within the specified range.</li> <li>e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.</li> <li>f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.</li> </ul> |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|            |                         |
|------------|-------------------------|
| Test Setup | Appendix A - Figure A.1 |
|------------|-------------------------|

### Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as described above using the 99% Occupied Bandwidth function. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device. The DUT was set to transmit at its maximum Duty Cycle. The 99% Occupied Bandwidth was measured and recorded.

Plot 7.1 – Occupied Bandwidth, NFC



Channel: -  
Mode: NFC

Channel Frequency: 13.56 MHz  
Modulation: ASK

Measured Occupied Bandwidth: 1.56 Hz

Table 7.1 - Summary of Occupied Bandwidth Measurements (NFC)

| 99% Occupied Bandwidth Results: NFC |                         |      |            |                                  |                     |
|-------------------------------------|-------------------------|------|------------|----------------------------------|---------------------|
| Channel Number                      | Channel Frequency (MHz) | Mode | Modulation | Measured Occupied Bandwidth (Hz) | Emission Designator |
| -                                   | 13.56                   | NFC  | ASK        | 1.56                             | 1H56A1D             |
|                                     |                         |      |            | Result:                          | Complies            |

## 8.0 NFC FIELD STRENGTH / EMISSIONS MASK

### Test Procedure

|                            |                                                     |
|----------------------------|-----------------------------------------------------|
| <b>Normative Reference</b> | <b>FCC 47 CFR §2.1046, §15.225</b>                  |
|                            | <b>KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.6)</b> |

### Limits

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| §15.225         | <p><b>Operation within the band 13.110-14.010 MHz.</b></p> <p>(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.</p> <p>(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.</p> <p>(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.</p> <p>(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.</p> |
| RSS-210 B.10(6) | <p><b>Band 13.110-14.010 MHz</b></p> <p>(a) the field strength of any emission shall not exceed the following limits:</p> <p>(i) 15.848 mV/m (84 dBµV/m) at 30 m, within the band 13.553-13.567 MHz</p> <p>(ii) 334 µV/m (50.5 dBµV/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz</p> <p>(iii) 106 µV/m (40.5 dBµV/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz</p> <p>(iv) RSS-Gen general field strength limits for frequencies outside the band 13.110-14.010 MHz</p>                                                                                                                                                                      |

### General Procedure

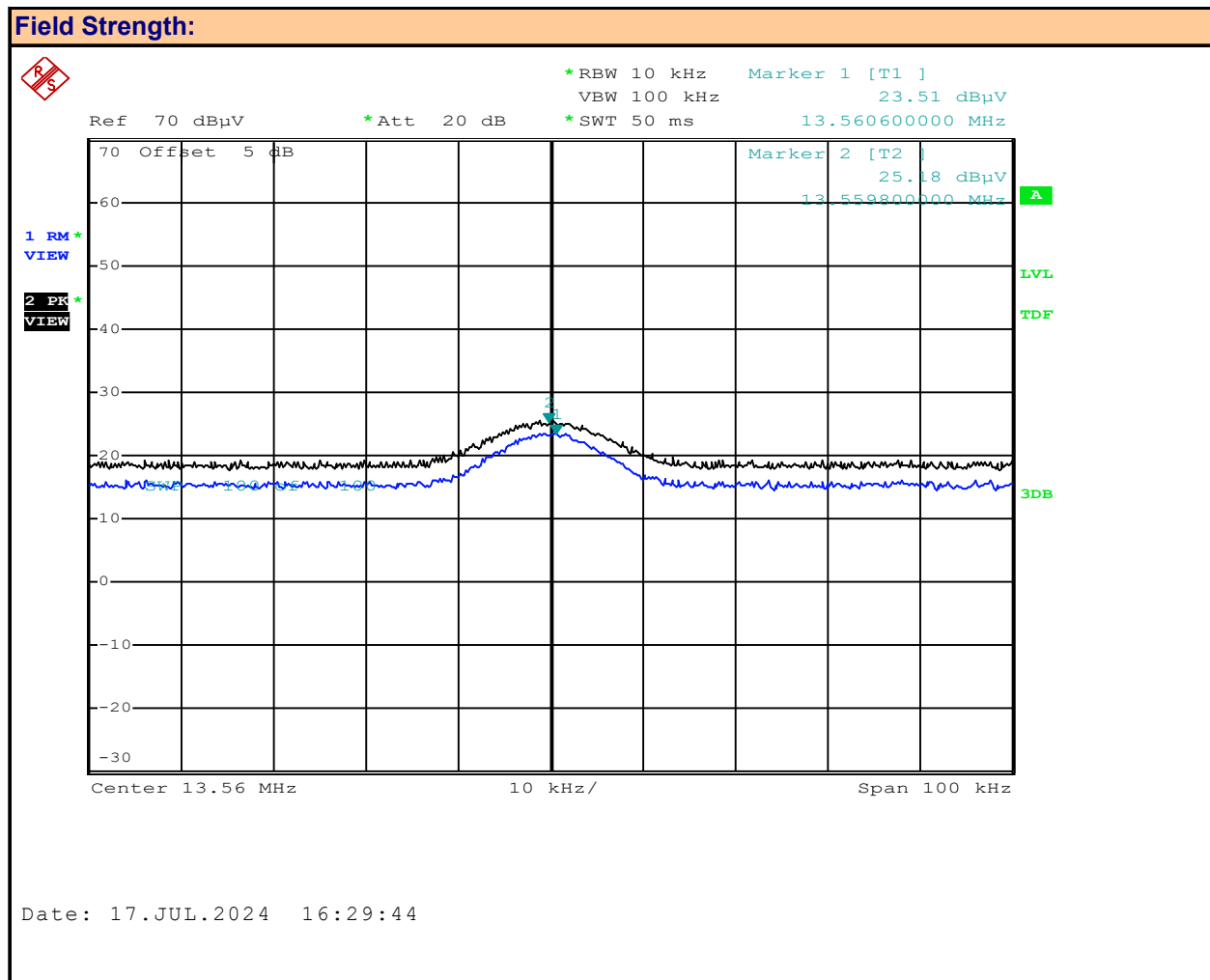
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C63.10 (6.5.4) | <p><b>6.5.4 Final radiated emission tests</b></p> <p>Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported.</p> <p>Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.</p> |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                   |                   |                   |
|-------------------|-------------------|-------------------|
| <b>Test Setup</b> | <b>Appendix A</b> | <b>Figure A.2</b> |
|-------------------|-------------------|-------------------|

### Measurement Procedure

The DUT place on a 80cm high turntable on an Open Area Test Site (OATS) at a distance of 3m from the measurement antenna. The DUT was set to transmit at maximum power and duty cycle. The DUT was rotated 360 degrees and scanned with the receive antenna elevated from 1 to 4m. The emissions were measured and recorded.

Plot 8.1 – Field Strength, NFC, Front



Polarization: **Front**

Channel: **-**

Mode: **NFC**

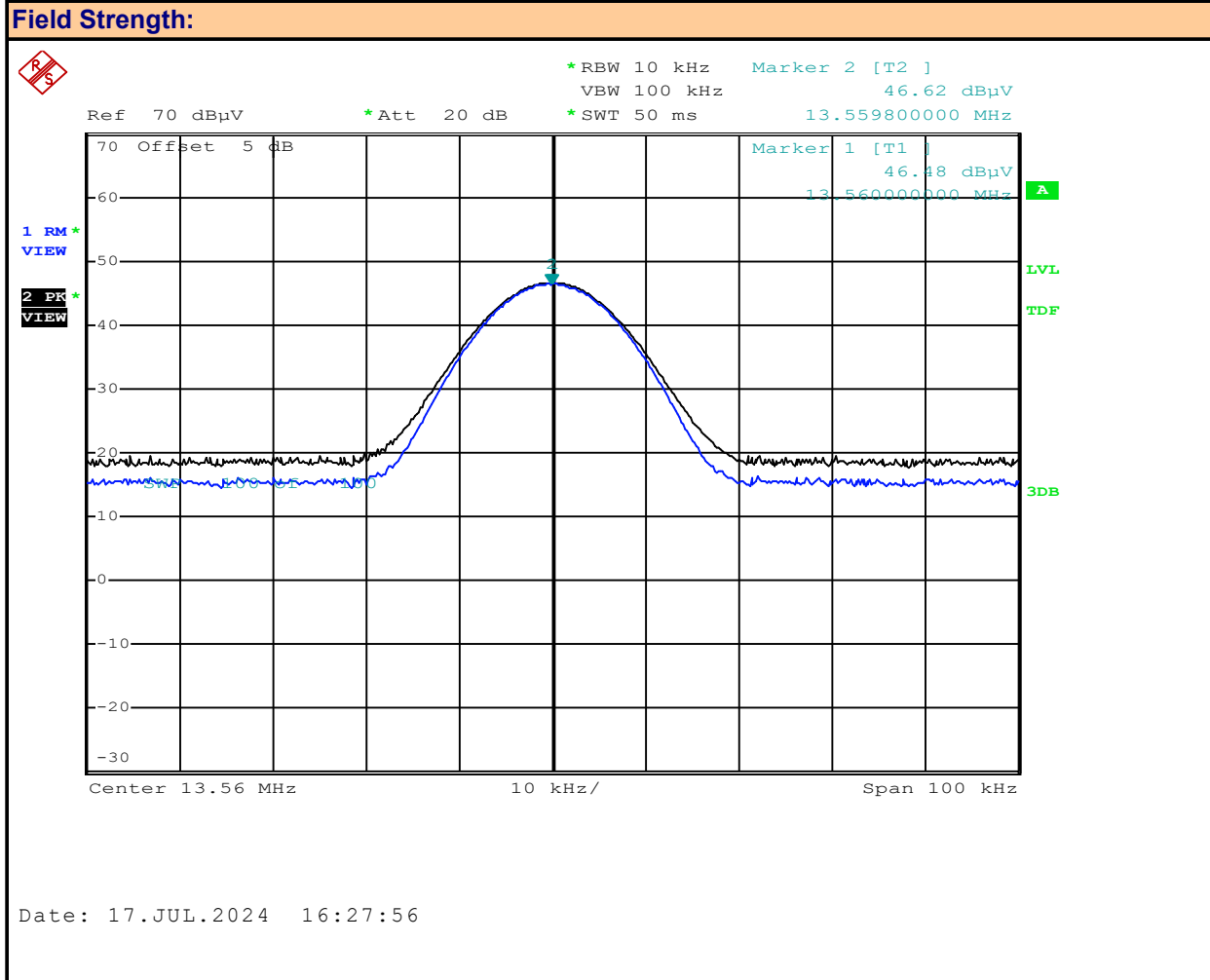
Channel Frequency: **13.56** MHz

Modulation: **ASK**

Measured Field Strength (Pk): **25.18** dBμV/m

Measured Field Strength (Av): **24.04** dBμV/m

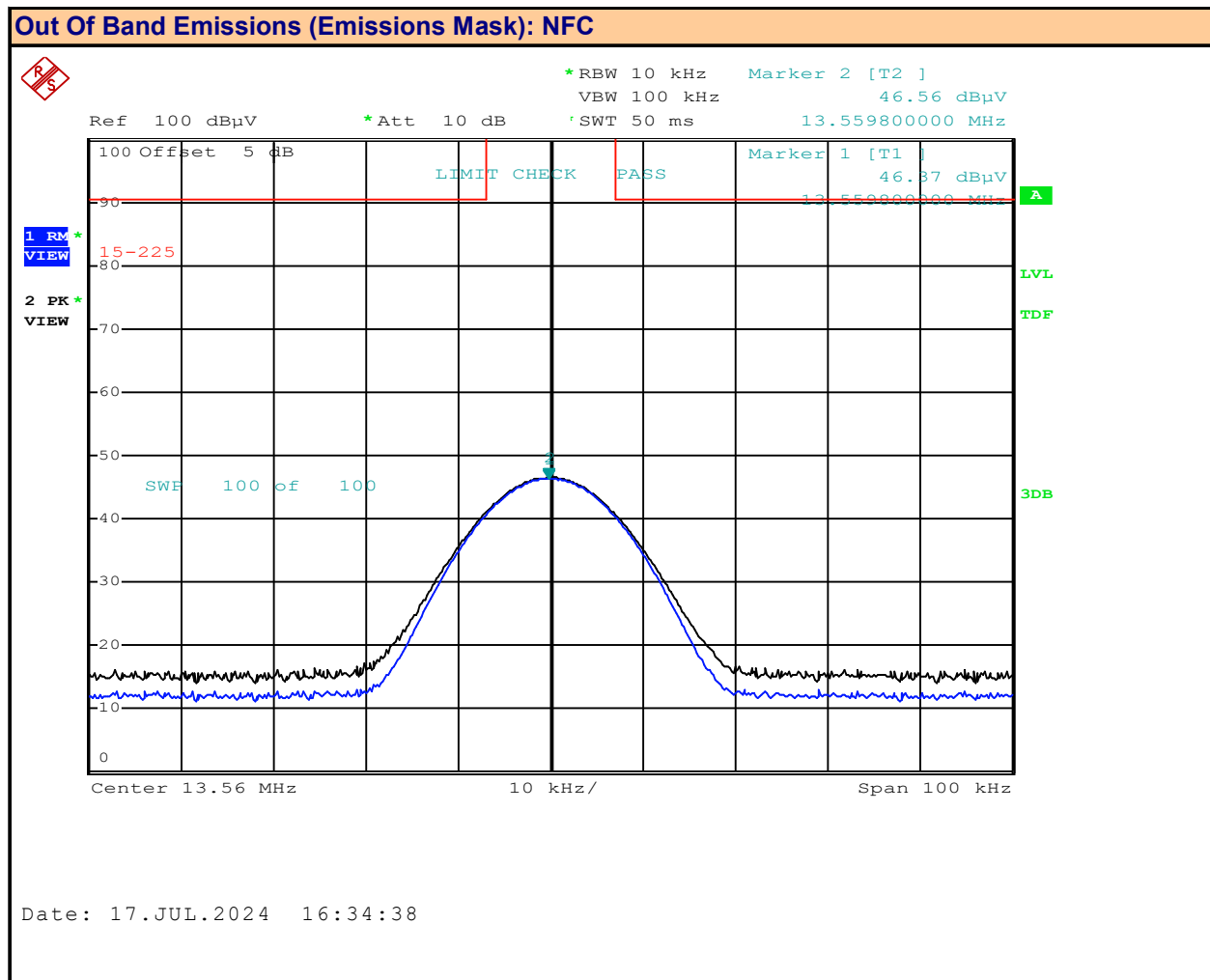
Plot 8.2 – Field Strength, NFC, Side



Polarization: **Side**  
Channel: **-**  
Mode: **NFC**

Channel Frequency: **13.56** MHz  
Modulation: **ASK**  
Measured Field Strength (Pk): **46.62** dBuV/m  
Measured Field Strength (Av): **46.48** dBuV/m

Plot 8.3 – Emissions Mask, NFC, Side



Polarization: **Side**

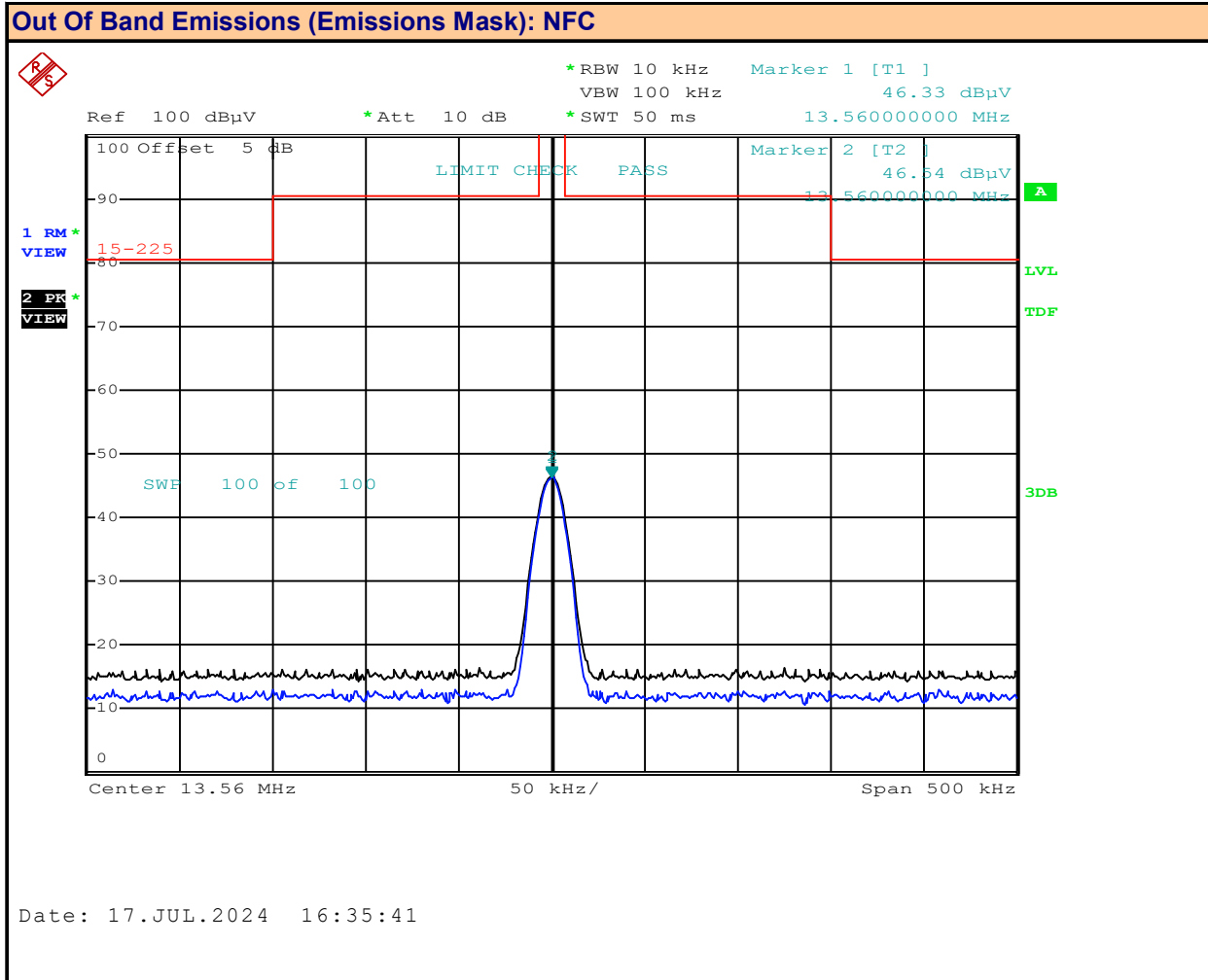
Channel: **-**

Mode: **NFC**

Channel Frequency: **13.56** MHz

Modulation: **ASK**

Plot 8.4 – Emissions Mask, NFC, Side



Polarization: **Side**  
Channel: **-**  
Mode: **NFC**

Channel Frequency: **13.56** MHz  
Modulation: **ASK**

**Table 8.1 – Summary of Field Strength Measurements (NFC)**

| Radiated Field Strength |      |            |          |                             |                                                                    |                                             |                                     |                                                                      |                                                    |                                                   |                    |                       |
|-------------------------|------|------------|----------|-----------------------------|--------------------------------------------------------------------|---------------------------------------------|-------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------|--------------------|-----------------------|
| Frequency<br><br>(MHz)  | Mode | Modulation | Detector | Antenna<br><br>Polarization | Measured<br>Field Strength<br>[FS <sub>Meas</sub> ]<br>(dBuV @ 3m) | Cable<br>Loss<br>[L <sub>C</sub> ]<br>(dBm) | Receive<br>Antenna<br>[ACF]<br>(dB) | Corrected<br>Field Strength<br>[FS <sub>Corr</sub> ]<br>(dBuV/m @3m) | Limit<br>@30m<br>[Lim <sub>30m</sub> ]<br>(dBuV/m) | Limit*<br>@3m<br>[Lim <sub>3m</sub> ]<br>(dBuV/m) | Margin<br><br>(dB) | Emissions<br><br>Mask |
| 13.56                   | NFC  | ASK        | RMS      | Front                       | 23.51                                                              | 0.5                                         | 10.5                                | 34.51                                                                | 84.00                                              | 124.0                                             | 89.5               | Pass                  |
|                         |      |            |          | Side                        | 46.48                                                              |                                             |                                     | 57.48                                                                |                                                    |                                                   | 66.5               | Pass                  |
|                         |      |            | Peak     | Front                       | 25.18                                                              |                                             |                                     | 36.18                                                                | 104.00                                             | 144.0                                             | 107.8              | Pass                  |
|                         |      |            |          | Side                        | 46.62                                                              |                                             |                                     | 57.62                                                                |                                                    |                                                   | 86.4               | Pass                  |
| Result:                 |      |            |          |                             |                                                                    |                                             |                                     |                                                                      |                                                    |                                                   | Complies           |                       |

\* Limit @ 3m = Limit @ 30m + 40dB/decade = 84dBuV/m + 40dB = 124dBuV/m (Average)

\* Limit @ 3m = Limit @ 30m + 40dB/decade = 104dBuV/m + 40dB = 144dBuV/m (Peak)

$FS_{Corr} = FS_{Meas} + ACF + L_C$

$Margin = Limit_{3m} - FS_{Corr}$

**Table 8.1 – Summary of Field Strength Measurements (NFC) – Cont.**

| Radiated Field Strength |      |            |          |                             |                                                                    |                                             |                                                       |                                                                     |                                                    |                                                    |                    |                       |
|-------------------------|------|------------|----------|-----------------------------|--------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------|--------------------|-----------------------|
| Frequency<br><br>(MHz)  | Mode | Modulation | Detector | Antenna<br><br>Polarization | Measured<br>Field Strength<br>[FS <sub>Meas</sub> ]<br>(dBuV @ 3m) | Cable<br>Loss<br>[L <sub>c</sub> ]<br>(dBm) | Receive<br>Antenna<br>[ACF <sup>H</sup> ]<br>(dBuA/m) | Corrected<br>Field Strength<br>[H <sub>Corr</sub> ]<br>(dBuA/m @3m) | Limit<br>@30m<br>[Lim <sub>30m</sub> ]<br>(dBuV/m) | Limit**<br>@3m<br>[Lim <sub>3m</sub> ]<br>(dBuA/m) | Margin<br><br>(dB) | Emissions<br><br>Mask |
| 13.56                   | NFC  | ASK        | RMS      | Front                       | 23.51                                                              | 0.5                                         | -41                                                   | -16.99                                                              | 84.00                                              | 72.5                                               | 89.5               | Pass                  |
|                         |      |            |          | Side                        | 46.48                                                              |                                             |                                                       | 5.98                                                                |                                                    |                                                    | 66.5               | Pass                  |
|                         |      |            | Peak     | Front                       | 25.18                                                              |                                             |                                                       | -15.32                                                              | 104.00                                             | 92.5                                               | 107.8              | Pass                  |
|                         |      |            |          | Side                        | 46.62                                                              |                                             |                                                       | 6.12                                                                |                                                    |                                                    | 86.4               | Pass                  |
| Result:                 |      |            |          |                             |                                                                    |                                             |                                                       |                                                                     |                                                    |                                                    | Complies           |                       |

\*\* Limit @ 3m = Limit @ 30m + 40dB/decade = 84dBuV/m + 40dB = 124dBuV/m (Average)

\*\* Limit @ 3m = Limit @ 30m + 40dB/decade = 104dBuV/m + 40dB = 144dBuV/m (Peak)

In accordance with ISED Notice 2020 - DRS0023:

"Guidance on Magnetic Field Strength Radiated Emissions Measurements 9kHz - 30MHz"

#### Limit Correction

$$\text{Limit}^H (\text{dBuA/m}) = \text{Limit}^E (\text{dBuV/m}) - Z_0 (\text{dB}\Omega)$$

Where  $Z_0$  = Free-Space Impedance =  $120\pi\Omega = 377\Omega \Rightarrow 20\log 377\Omega = 51.5\text{dB}\Omega$

$$\text{Limit}^H (\text{dBuA/m}) = \text{Limit}^E (\text{dBuV/m}) - Z_0 (\text{dB}\Omega) = 124\text{dBuV/m} - 51.5\text{dB}\Omega = 72.5\text{dBuA/m @ 3m (Average)}$$

$$\text{Limit}^H (\text{dBuA/m}) = \text{Limit}^E (\text{dBuV/m}) - Z_0 (\text{dB}\Omega) = 144\text{dBuV/m} - 51.5\text{dB}\Omega = 92.5\text{dBuA/m @ 3m (Peak)}$$

#### Measurement Correction

$$H_{\text{Corr}} (\text{dBuA/m}) = E_{\text{Meas}} (\text{dBuV}) + \text{ACF}^H (\text{dB}/\Omega\text{m}) + L_c - G_A$$

Where  $\text{ACF}^H$  is the Magnetic Antenna Correction Factor,  $L_c$  is Cable Loss,  $G_A$  is Pre-Amplifier Gain

External Pre-Amplifier ( $G_A$ ) not used

$$\text{Margin} = \text{Limit}_{3\text{m}} - H_{\text{Corr}}$$

## 9.0 RADIATED SPURIOUS EMISSIONS – RESTRICTED BANDS

### Test Procedure

|                     |                                                           |
|---------------------|-----------------------------------------------------------|
| Normative Reference | FCC 47 CFR §2.1051, §, §15.205(a), §15.205(c), §15.209(a) |
|                     | KDB 558074 (8.6), ANSI C63.10 (11.12)                     |

### Limits

|                   |                                                                                                                                                                           |                                          |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| 47 CFR §15.209(a) | <b>§15.209 Radiated emission limits; general requirements.</b>                                                                                                            |                                          |
|                   | (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table: |                                          |
|                   | <b>Frequency (MHz)</b>                                                                                                                                                    | <b>Field Strength (microvolts/meter)</b> |
|                   | 0.009 - 0.490                                                                                                                                                             | 2400/F (kHz) @300m                       |
|                   | 0.490 - 1.705                                                                                                                                                             | 24000/F (kHz) @30m                       |
|                   | 1.705 - 30                                                                                                                                                                | 30 @ 30m                                 |
|                   | 30 - 88                                                                                                                                                                   | 100 @3m                                  |
|                   | 88 - 216                                                                                                                                                                  | 150 @3m                                  |
|                   | 216 - 960                                                                                                                                                                 | 200 @3m                                  |
|                   | Above 960                                                                                                                                                                 | 500 @3m                                  |

**Table 9.1 – Summary of Radiated Tx Emissions**

See Appendix J for Measurement Plots

| Summary of Radiated Tx Emissions |                         |                      |                          |                                               |                        |                                   |                                       |                                                  |              |             |
|----------------------------------|-------------------------|----------------------|--------------------------|-----------------------------------------------|------------------------|-----------------------------------|---------------------------------------|--------------------------------------------------|--------------|-------------|
| Measured Frequency Range (MHz)   | Channel Frequency (MHz) | Antenna Polarization | Emission Frequency (MHz) | Measured Emission [E <sub>Meas</sub> ] (dBuV) | Antenna ACF [ACF] (dB) | Cable Loss [L <sub>c</sub> ] (dB) | Amplifier Gain [G <sub>A</sub> ] (dB) | Corrected Emission [E <sub>Corr</sub> ] (dBuV/m) | Limit (dBuV) | Margin (dB) |
| 30-1000 MHz                      | 13.6                    | Horizontal           | ND                       | (1) AV                                        | n/a                    | n/a                               | 0.00 (3)                              | ND                                               | n/a          | (1)         |
|                                  |                         | Vertical             | ND                       | (1) AV                                        | n/a                    | n/a                               | 0.00 (3)                              | ND                                               | n/a          | (1)         |
| Results:                         |                         |                      |                          |                                               |                        |                                   |                                       |                                                  | Complies     |             |

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit

(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor

(3) External Amplifier not used

$$E_{\text{Corr}} = E_{\text{Meas}} + ACF^E + L_C - G_A$$

Where ACF<sup>E</sup> is the Electric Antenna Correction Factor

\* Without Manufacturer's Accessories, \*\* With Manufacturer's Accessories

## 10.0 RADIATED RX SPURIOUS EMISSIONS

### Test Procedure

|                     |                                              |
|---------------------|----------------------------------------------|
| Normative Reference | FCC 47 CFR §2.1046                           |
|                     | KDB 558074 (8.3.2), ANSI C63.10 (11.9.2.2.6) |

### General Procedure

C63.10 (6.5.4)

#### 6.5.4 Final radiated emission tests

Using the orientation and equipment arrangement of the EUT, and based on the measurement results found during the exploratory measurement in 6.5.3, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement. The final measurement shall follow all the procedures in 6.3 with the EUT operating on frequencies per 5.6. For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable) and the frequency and amplitude of the six highest spurious emissions relative to the limit; emissions more than 20 dB below the limit do not need to be reported.

Measurements are performed with the EUT rotated from 0° to 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Variations in cable or wire placement shall be explored to maximize the measured emissions.

### Test Setup

Appendix A

Figure A.2

### Measurement Procedure

The DUT place on a 80cm high turntable on an Open Area Test Site (OATS) at a distance of 3m from the measurement antenna. The DUT was set to transmit at maximum power and duty cycle. The DUT was rotated 360 degrees and scanned with the receive antenna elevated from 1 to 4m. The emissions were measured and recorded.

**Table 10.1 – Summary of Radiated Rx Emissions**

See Appendix J for Measurement Plots

| Summary of Radiated Rx Emissions        |                               |                         |                                |                                                        |                                 |                                            |                                                |                                                           |                 |                |
|-----------------------------------------|-------------------------------|-------------------------|--------------------------------|--------------------------------------------------------|---------------------------------|--------------------------------------------|------------------------------------------------|-----------------------------------------------------------|-----------------|----------------|
| Measured<br>Frequency<br>Range<br>(MHz) | Channel<br>Frequency<br>(MHz) | Antenna<br>Polarization | Emission<br>Frequency<br>(MHz) | Measured<br>Emission<br>[E <sub>Meas</sub> ]<br>(dBuV) | Antenna<br>ACF<br>[ACF]<br>(dB) | Cable<br>Loss<br>[L <sub>c</sub> ]<br>(dB) | Amplifier<br>Gain<br>[G <sub>A</sub> ]<br>(dB) | Corrected<br>Emission<br>[E <sub>Corr</sub> ]<br>(dBuV/m) | Limit<br>(dBuV) | Margin<br>(dB) |
| 30-1000                                 | -                             | Horizontal              | (1)                            | (1) AV                                                 | -                               | -                                          | 0.00 (3)                                       | (1)                                                       | -               | (1)            |
| 30-1000                                 | -                             | Vertical                | (1)                            | (1) AV                                                 | -                               | -                                          | 0.00 (3)                                       | (1)                                                       | -               | (1)            |
| Results:                                |                               |                         |                                |                                                        |                                 |                                            |                                                |                                                           | Complies        |                |

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit

(3) External Amplifier not used

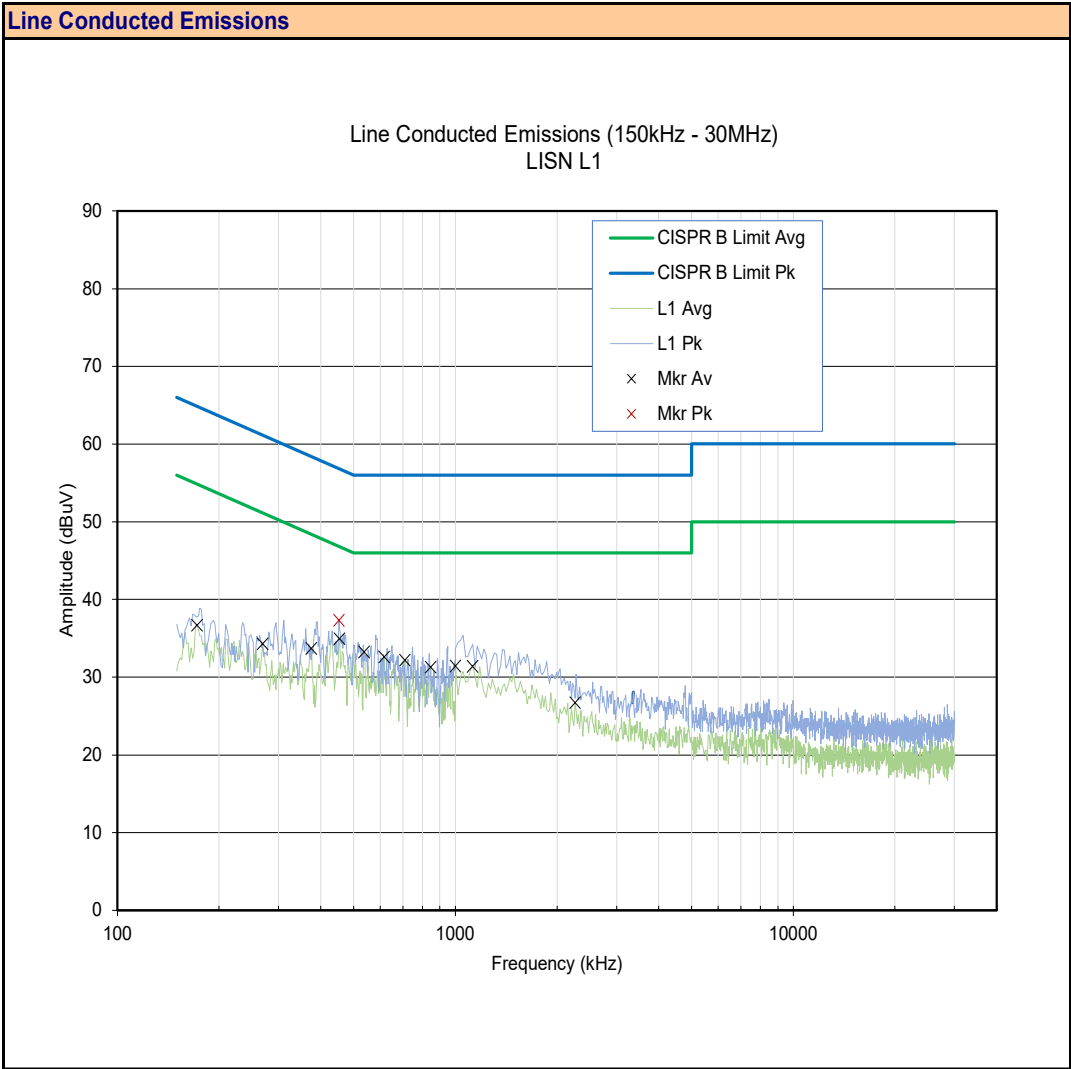
$$E_{\text{Corr}} = E_{\text{Meas}} + ACF^E + L_C - G_A$$

Where  $ACF^E$  is the Electric Antenna Correction Factor

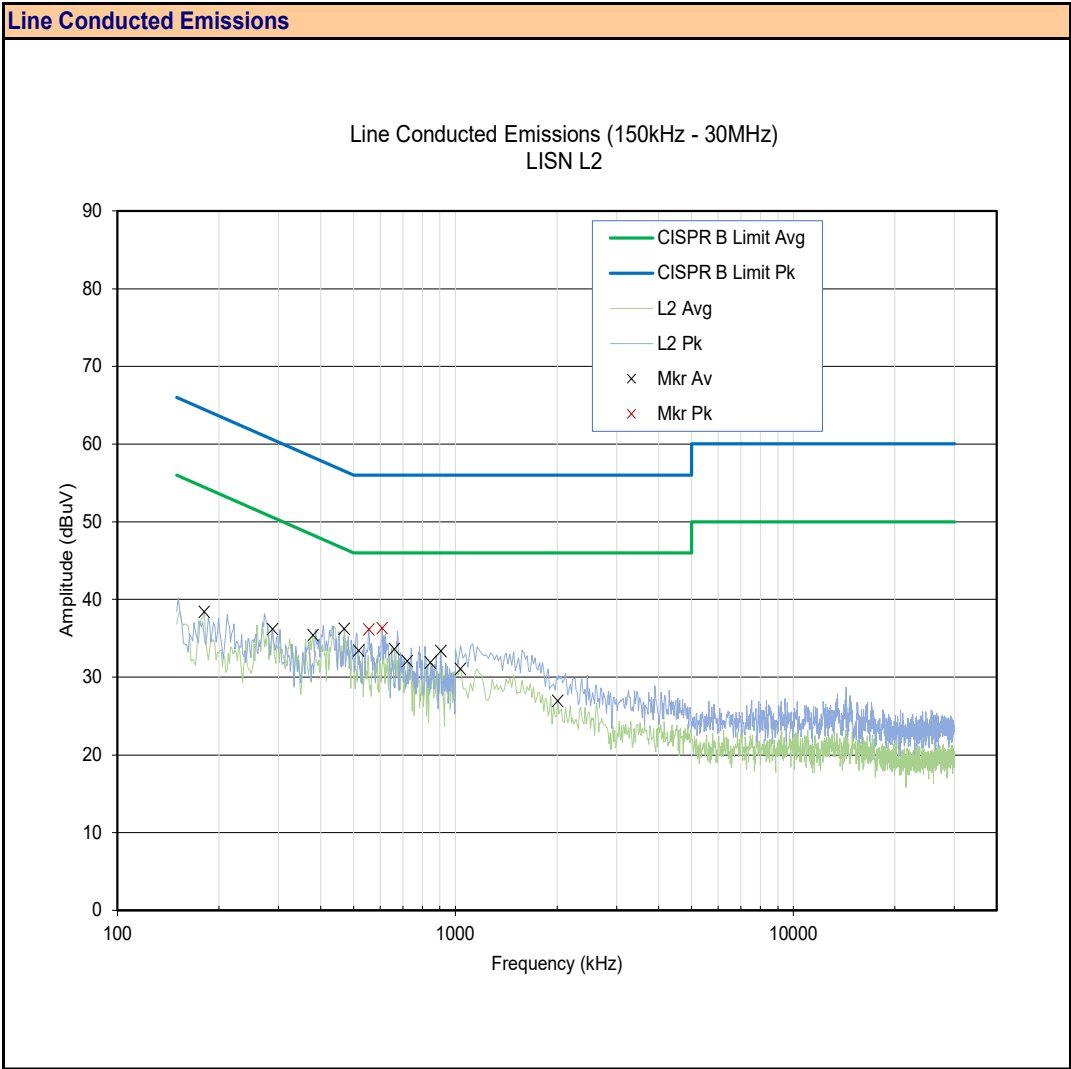
## 11.0 POWER LINE CONDUCTED EMISSIONS

| Test Procedure      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Normative Reference | FCC 47 CFR §15.107, ICES-003(6.1)<br>ANSI C63.4-2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Limits              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 47 CFR §15.107      | <p>(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 <math>\mu</math>H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.</p> <p>0.15-0.5MHz: 66-56 dBuV Quasi Peak, 56-46 dBuV Average, Decreases with the logarithm of the frequency</p> <p>0.5 - 5.0 MHz: 56 dBuV Quasi Peak, 46 dBuV Average</p> <p>5.0 - 30.0 MHz: 60 dBuV Quasi Peak, 50 dBuV Average</p> |
| ICES-003(6.1)       | <p>6.1 - AC Power Line Conducted Emissions Limits</p> <p>Class B: ITE that does not meet the conditions for Class A operation shall comply with the Class B radiated limits set out in Table 2.</p> <p>0.15-0.5MHz: 66-56 dBuV Quasi Peak, 56-46 dBuV Average, Decreases with the logarithm of the frequency</p> <p>0.5 - 5.0 MHz: 56 dBuV Quasi Peak, 46 dBuV Average</p> <p>5.0 - 30.0 MHz: 60 dBuV Quasi Peak, 50 dBuV Average</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Test Setup          | Appendix A      Figure A.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

Plot 11.1 – Power Line Conducted Emissions, Line 1



Plot 11.2 – Power Line Conducted Emissions, Line 2



**Table 11.1 – Summary of Power Line Conducted Emissions – L1**

| <b>§15.107, ICES-003 (6.1)</b> |             |                 |                            |                 |                 |
|--------------------------------|-------------|-----------------|----------------------------|-----------------|-----------------|
| <b>Emission</b>                | <b>LISN</b> | <b>Detector</b> | <b>Corrected Emission</b>  | <b>Limit</b>    | <b>Margin</b>   |
| <b>Frequency</b>               | <b>Port</b> |                 | <b>[E<sub>Corr</sub>]*</b> | <b>[Limit]</b>  | <b>[Margin]</b> |
|                                |             |                 | <b>(W)</b>                 | <b>(dBuV/m)</b> | <b>(dB)</b>     |
| 172.1 kHz                      | L1          | Average         | 36.68                      | 55.3            | <b>18.6</b>     |
| 269.0 kHz                      | L1          | Average         | 34.29                      | 51.4            | <b>17.1</b>     |
| 374.4 kHz                      | L1          | Average         | 33.71                      | 48.5            | <b>14.8</b>     |
| 454.3 kHz                      | L1          | Average         | 34.95                      | 46.8            | <b>11.9</b>     |
| 537.6 kHz                      | L1          | Average         | 33.25                      | 46.0            | <b>12.7</b>     |
| 615.8 kHz                      | L1          | Average         | 32.60                      | 46.0            | <b>13.4</b>     |
| 709.3 kHz                      | L1          | Average         | 32.18                      | 46.0            | <b>13.8</b>     |
| 845.3 kHz                      | L1          | Average         | 31.30                      | 46.0            | <b>14.7</b>     |
| 1000.0 kHz                     | L1          | Average         | 31.44                      | 46.0            | <b>14.6</b>     |
| 1126.0 kHz                     | L1          | Average         | 31.39                      | 46.0            | <b>14.6</b>     |
| 2260.0 kHz                     | L1          | Average         | 26.71                      | 46.0            | <b>19.3</b>     |
| 452.6 kHz                      | L1          | Peak            | 37.31                      | 56.9            | <b>19.6</b>     |
| <b>Results:</b>                |             |                 |                            | <b>Complies</b> |                 |

\* Measurement Compensated for Cable Loss and Antenna Correction Factor

$$E_{\text{Corr}} = E_{\text{Meas}} + L_C + \text{AFC}$$

$$\text{Margin} = \text{Limit} - E_{\text{Corr}}$$

**Table 11.2 – Summary of Power Line Conducted Emissions – L2**

| §15.107, ICES-003 (6.1)   |                  |          |                                                       |                              |                            |
|---------------------------|------------------|----------|-------------------------------------------------------|------------------------------|----------------------------|
| Emission<br><br>Frequency | LISN<br><br>Port | Detector | Corrected<br>Emission<br>[E <sub>Corr</sub> ]*<br>(W) | Limit<br>[Limit]<br>(dBuV/m) | Margin<br>[Margin]<br>(dB) |
| 180.6 kHz                 | L2               | Average  | 38.42                                                 | 54.8                         | 16.4                       |
| 287.7 kHz                 | L2               | Average  | 36.20                                                 | 50.8                         | 14.6                       |
| 379.5 kHz                 | L2               | Average  | 35.41                                                 | 48.4                         | 13.0                       |
| 469.6 kHz                 | L2               | Average  | 36.21                                                 | 46.5                         | 10.3                       |
| 517.2 kHz                 | L2               | Average  | 33.42                                                 | 46.0                         | 12.6                       |
| 660.0 kHz                 | L2               | Average  | 33.61                                                 | 46.0                         | 12.4                       |
| 721.2 kHz                 | L2               | Average  | 32.06                                                 | 46.0                         | 13.9                       |
| 843.6 kHz                 | L2               | Average  | 31.90                                                 | 46.0                         | 14.1                       |
| 906.5 kHz                 | L2               | Average  | 33.35                                                 | 46.0                         | 12.6                       |
| 1036.0 kHz                | L2               | Average  | 31.07                                                 | 46.0                         | 14.9                       |
| 2008.0 kHz                | L2               | Average  | 26.95                                                 | 46.0                         | 19.1                       |
| 554.6 kHz                 | L2               | Peak     | 36.17                                                 | 56.0                         | 19.8                       |
| 607.3 kHz                 | L2               | Peak     | 36.31                                                 | 56.0                         | 19.7                       |
| <b>Results:</b>           |                  |          |                                                       | <b>Complies</b>              |                            |

\* Measurement Compensated for Cable Loss and Antenna Correction Factor

$$E_{\text{Corr}} = E_{\text{Meas}} + L_C + \text{AFC}$$

$$\text{Margin} = \text{Limit} - E_{\text{Corr}}$$

## 12.0 FREQUENCY STABILITY (NFC)

### Test Conditions

|                            |                             |
|----------------------------|-----------------------------|
| <b>Normative Reference</b> | FCC 47 CFR §2.1055, §15.225 |
|----------------------------|-----------------------------|

### Limits

47 CFR §15.225

(e) The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### Measurement Procedure

#### 47 CFR §2.1055 Frequency Stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From  $-30^{\circ}$  to  $+50^{\circ}$  centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than  $10^{\circ}$  centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

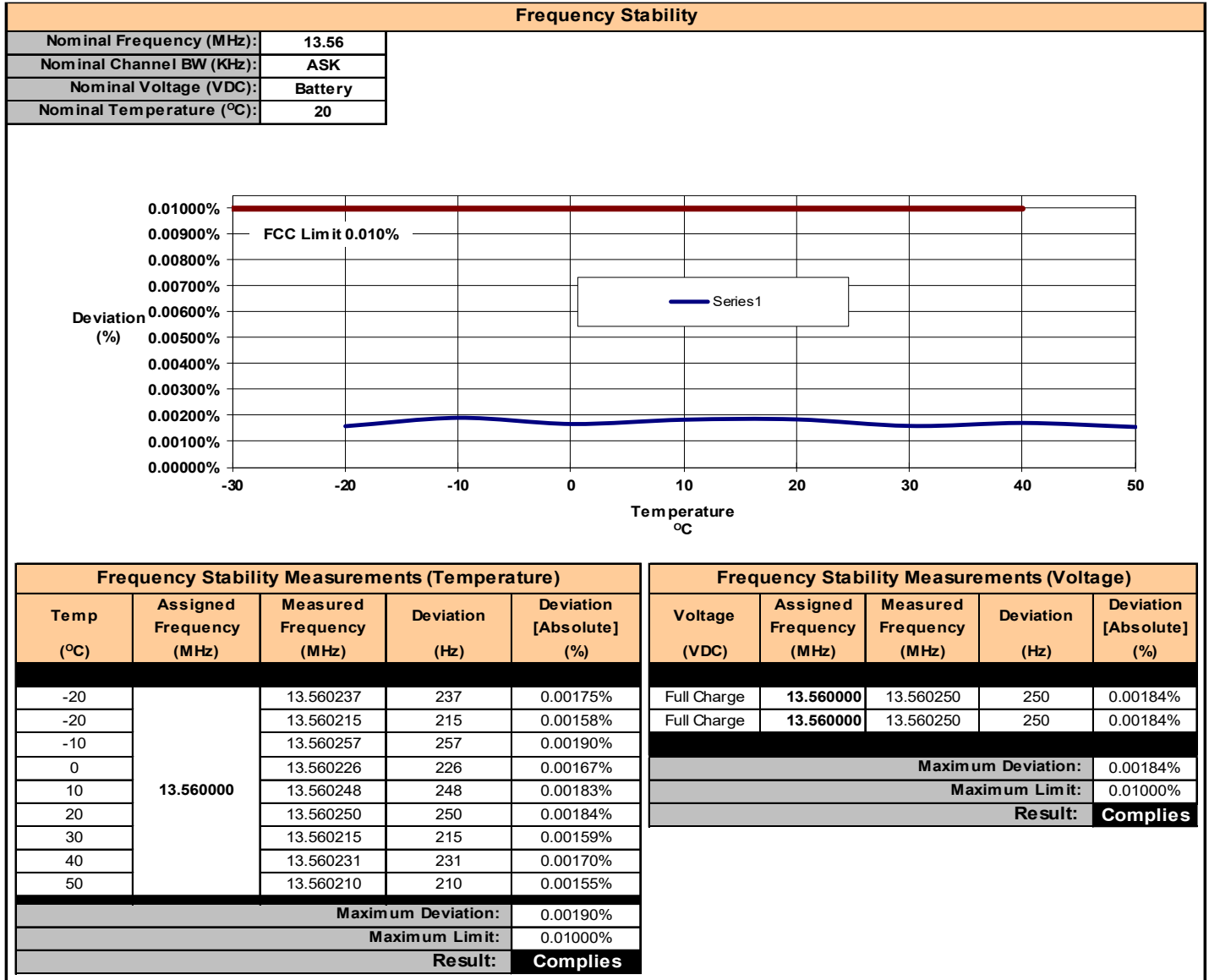
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

### Test Setup

Appendix A

5

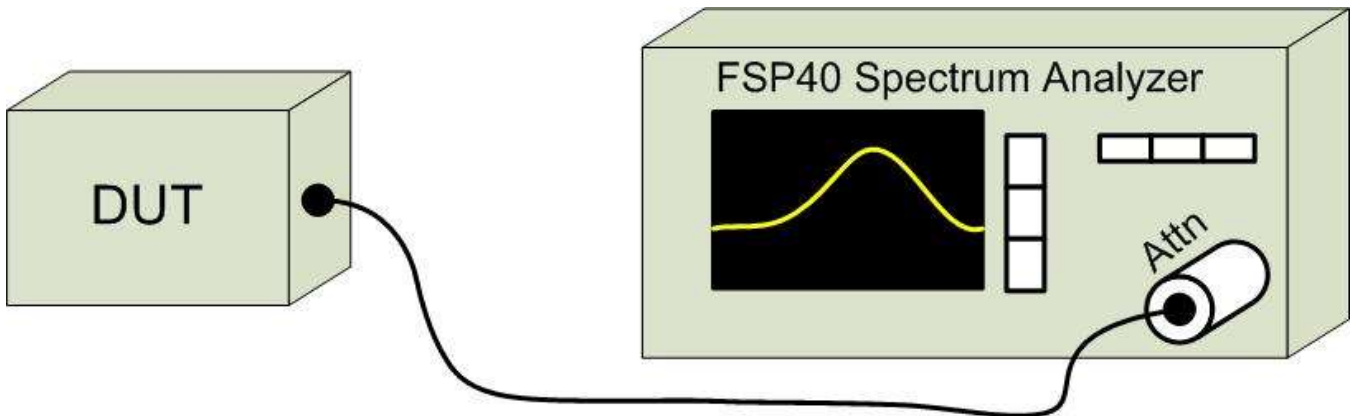
Table 12.1 – Summary of Frequency Stability Measurements – FCC



## APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT

**Table A.1 – Setup - Conducted Measurements Equipment List**

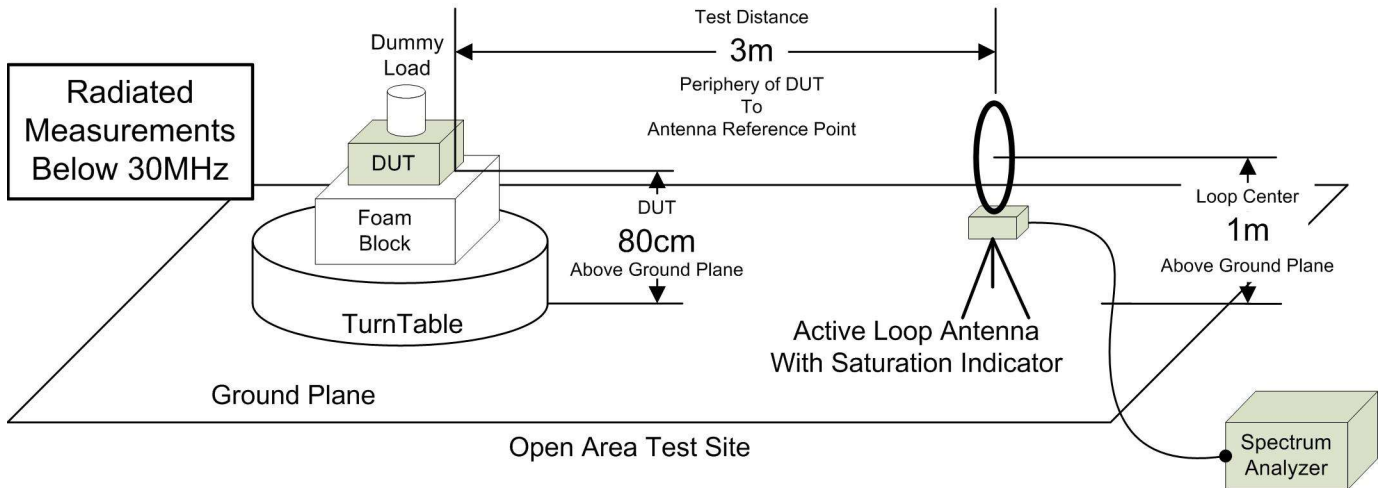
| Equipment List |              |               |               |                   |
|----------------|--------------|---------------|---------------|-------------------|
| Asset Number   | Manufacturer | Model Number  | Serial Number | Description       |
| 00241          | R&S          | FSU40         | 100500        | Spectrum Analyzer |
| 00263          | Koaxis       | KP10-1.00M-TD | 263           | 1m Armoured Cable |



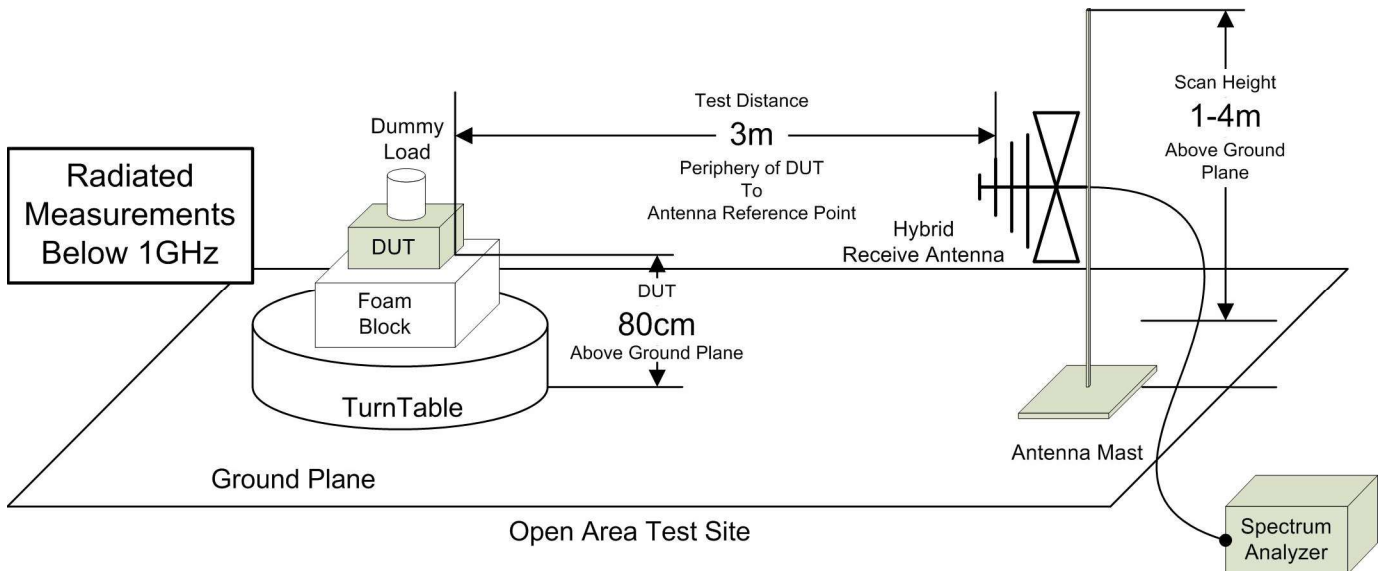
**Figure A.1 – Test Setup Conducted Measurements**

**Table A.2 – Setup - Radiated Emissions Equipment List**

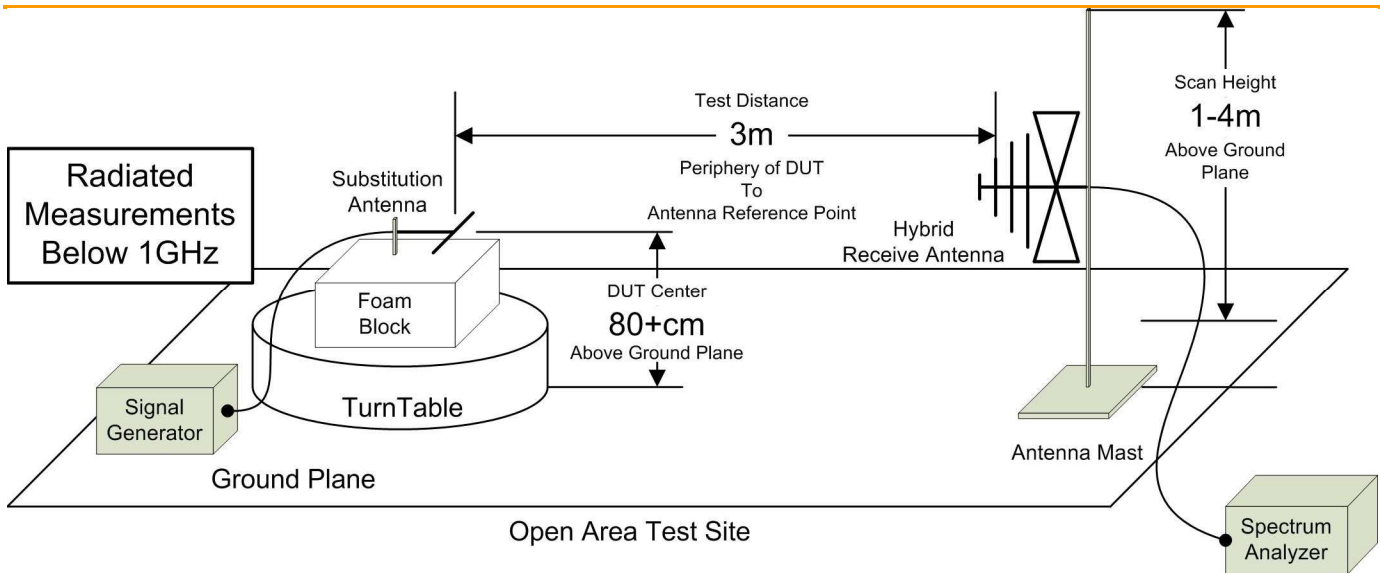
| <b>Equipment List</b> |                     |                     |                      |                             |
|-----------------------|---------------------|---------------------|----------------------|-----------------------------|
| <b>Asset Number</b>   | <b>Manufacturer</b> | <b>Model Number</b> | <b>Serial Number</b> | <b>Description</b>          |
| 00050                 | Chase               | CBL-6111A           | 1607                 | Bilog Antenna               |
| 00034                 | ETS                 | 3115                | 6267                 | Double Ridged Guide Horn    |
| 00035                 | ETS                 | 3115                | 6276                 | Double Ridged Guide Horn    |
| 00085                 | EMCO                | 6502                | 9203-2724            | Loop Antenna                |
| 00161                 | Waveline Inc.       | 889                 |                      | Standard Gain Horn 18-26GHz |
| 00162                 | Waveline Inc.       | 889                 |                      | Standard Gain Horn 18-26GHz |
| 00165                 | Waveline Inc.       | 801-KF              |                      | Waveguide Adapter 18-26GHz  |
| 00166                 | Waveline Inc.       | 801-KF              |                      | Waveguide Adapter 18-26GHz  |
| 00333                 | HP                  | 85685A              | 3010A01095           | RF Preselector              |
| 00049                 | HP                  | 85650A              | 2043A00162           | Quasi-peak Adapter          |
| 00051                 | HP                  | 8566B               | 2747A05510           | Spectrum Analyzer           |
| 00241                 | R&S                 | FSU40               | 100500               | Spectrum Analyzer           |
| 00265                 | Miteq               | JS32-00104000-58-5P | 1939850              | Microwave L/N Amplifier     |
| 00071                 | EMCO                | 2090                | 9912-1484            | Multi-Device Controller     |
| 00072                 | EMCO                | 2075                | 0001-2277            | Mini-mast                   |
| 00073                 | EMCO                | 2080                | 0002-1002            | Turn Table                  |
| 00263                 | Koaxis              | KP10-1.00M-TD       | 263                  | 1m Armoured Cable           |
| 00263B                | Koaxis              | KP10-1.00M-TD       | 263B                 | 1m Armoured Cable           |
| 00275                 | TMS                 | LMR400              | n/a                  | 25m Cable                   |
| 00278                 | TILE                | 34G3                | n/a                  | TILE Test Software          |



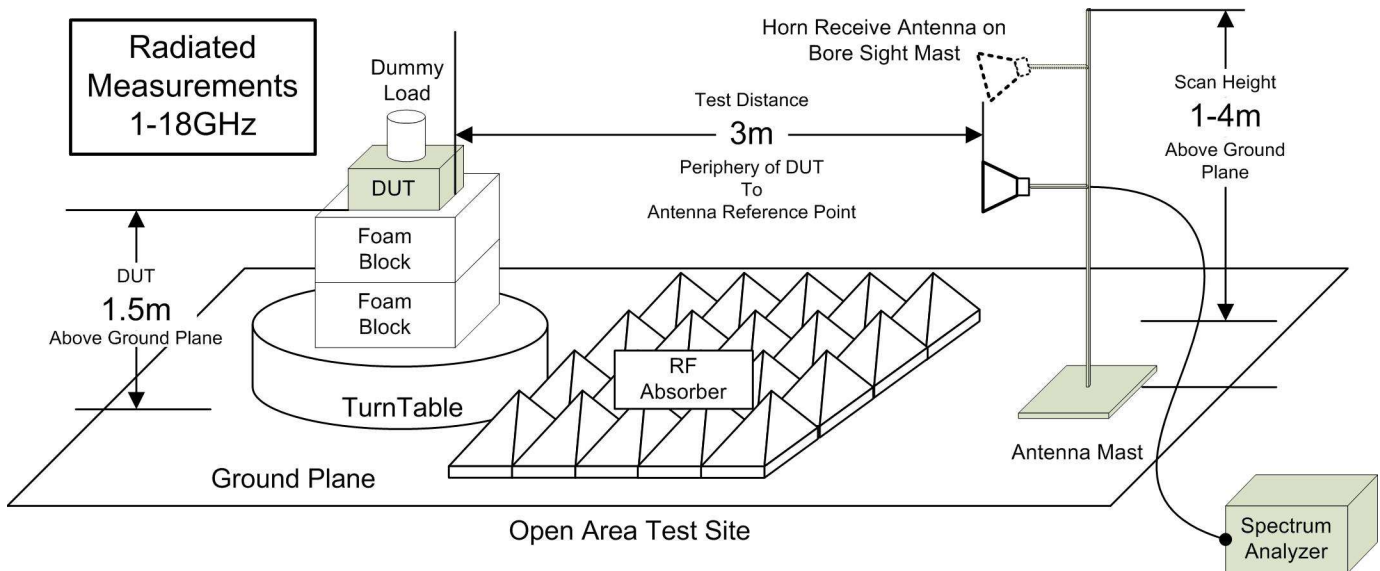
**Figure A.2 – Test Setup Radiated Emissions Measurements Below 30MHz**



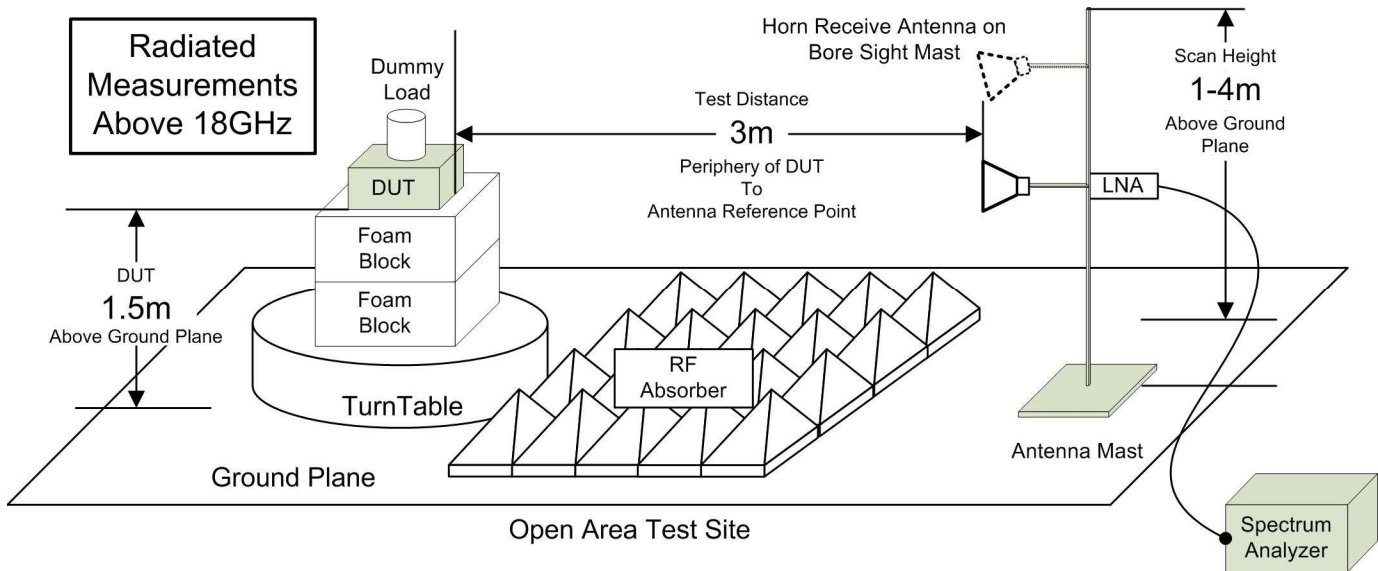
**Figure A.3 – Test Setup Radiated Emissions Measurements 30 – 1000MHz**



**Figure A.4 – Test Setup Radiated Emissions Measurements 30 – 1000MHz Signal Substitution**



**Figure A.5 – Test Setup Radiated Emissions Measurements 1 – 18GHz**



**Figure A.6 – Test Setup Radiated Emissions Measurements Above 18 GHz**

**Table A.3 – Power Line Conducted Measurement Equipment**

| Equipment List |              |              |                    |
|----------------|--------------|--------------|--------------------|
| Asset Number   | Manufacturer | Model Number | Description        |
| 00241          | R&S          | FSU40        | Spectrum Analyzer  |
| 00275          | Coaxis       | LMR400       | 25m Cable          |
| 00276          | Coaxis       | LMR400       | 4m Cable           |
| 00278          | TILE         | 34G3         | TILE Test Software |
| 00257          | Comm Power   | LI-215A      | LISN               |

**Figure A.7 – Test Setup Power Line Conducted Measurements**

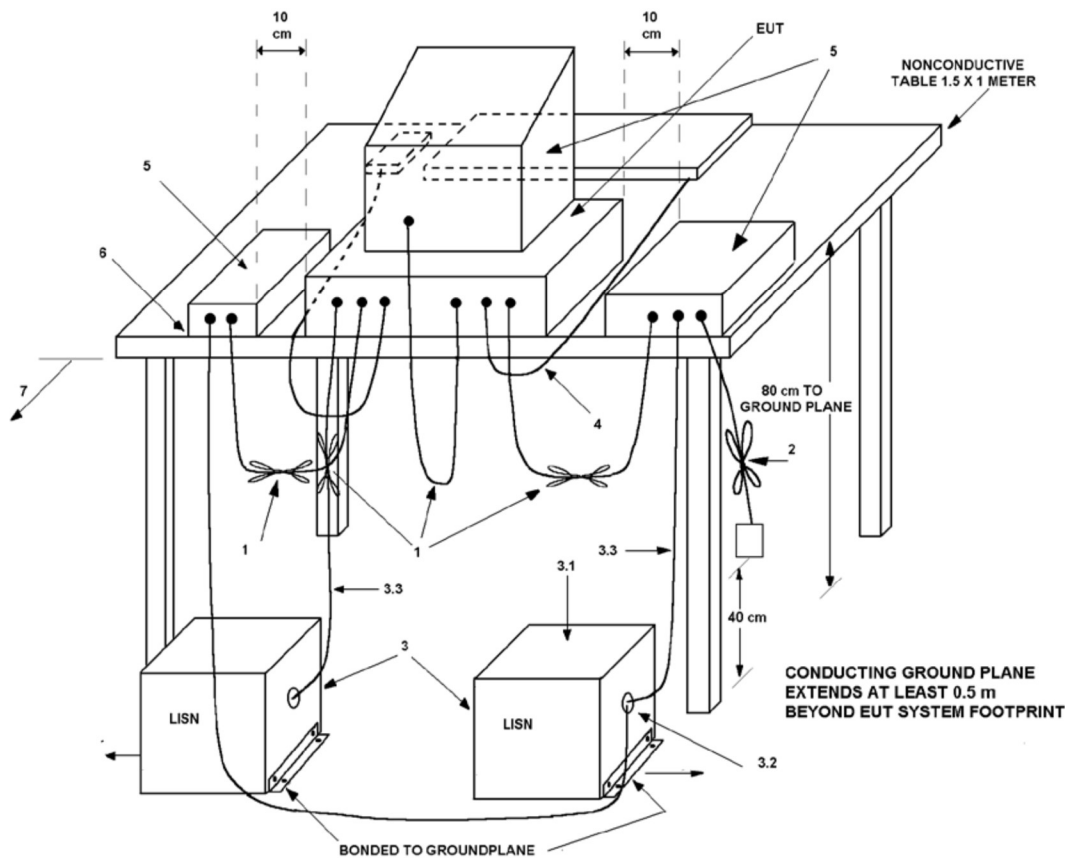


Table A.4 – Setup – Frequency Stability Equipment List

| Equipment List |              |              |               |                       |
|----------------|--------------|--------------|---------------|-----------------------|
| Asset Number   | Manufacturer | Model Number | Serial Number | Description           |
| 00241          | R&S          | FSU40        | 100500        | Spectrum Analyzer     |
| 00081          | ESPEC        | ECT-2        | 0510154-B     | Environmental Chamber |
| 00234          | VWR          | 61161-378    | 140320430     | Temp/Humidity Meter   |

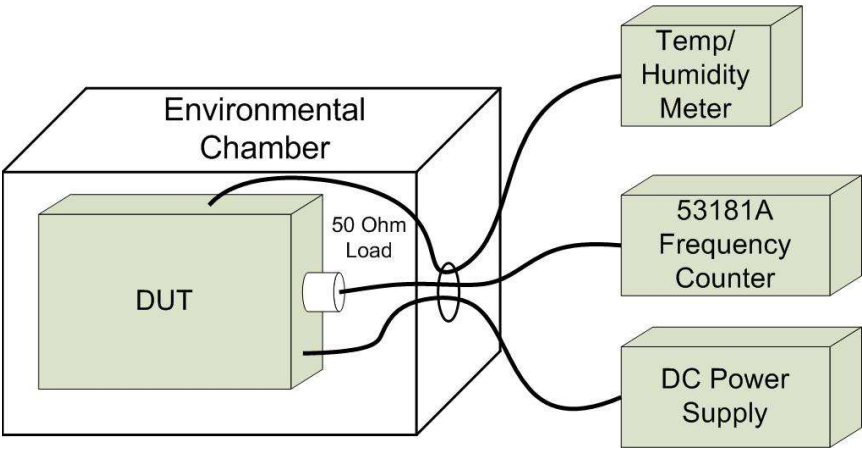


Figure A.8 – Frequency Stability

## APPENDIX B – EQUIPMENT LIST AND CALIBRATION

| Equipment List |               |               |               |                             |                 |                      |                 |
|----------------|---------------|---------------|---------------|-----------------------------|-----------------|----------------------|-----------------|
| Asset Number   | Manufacturer  | Model Number  | Serial Number | Description                 | Last Calibrated | Calibration Interval | Calibration Due |
| 00050          | Chase         | CBL-6111A     | 1607          | Bilog Antenna               | 16 Nov 2023     | Triennial            | 16 Nov 2026     |
| 00035          | ETS           | 3115          | 6276          | Double Ridged Guide Horn    | 4 Mar 2022      | Triennial            | 4 Mar 2025      |
| 00085          | EMCO          | 6502          | 9203-2724     | Loop Antenna                | 6 Sep 2022      | Triennial            | 6 Sep 2025      |
| 00161          | Waveline Inc. | 889           |               | Standard Gain Horn 18-26GHz | NCR             | n/a                  | NCR             |
| 00165          | Waveline Inc. | 801-KF        |               | Waveguide Adapter 18-26GHz  | NCR             | n/a                  | NCR             |
| 00241          | R&S           | FSU40         | 100500        | Spectrum Analyzer           | 10 Aug 2021     | Triennial            | 10 Aug 2024     |
| 00005          | HP            | 8648D         | 3847A00611    | Signal Generator            | 28 Jun 2023     | Triennial            | 28 Jun 2026     |
| 00003          | HP            | 53181A        | 3736A05175    | Frequency Counter           | 28 Jun 2023     | Triennial            | 28 Jun 2026     |
| 00257          | Com-Power     | LI-215A       | 191934        | LISN                        | 27 Dec 2021     | Triennial            | 27 Dec 2024     |
| 00071          | EMCO          | 2090          | 9912-1484     | Multi-Device Controller     | n/a             | n/a                  | n/a             |
| 00072          | EMCO          | 2075          | 0001-2277     | Mini-mast                   | n/a             | n/a                  | n/a             |
| 00073          | EMCO          | 2080          | 0002-1002     | Turn Table                  | n/a             | n/a                  | n/a             |
| 00081          | ESPEC         | ECT-2         | 0510154-B     | Environmental Chamber       | NCR             | n/a                  | CNR             |
| 00234          | VWR           | 61161-378     | 140320430     | Temp/Humidity Meter         | New             | Triennial            | New             |
| 00263          | Koaxis        | KP10-1.00M-TD | 263           | 1m Armoured Cable           | COU             | n/a                  | COU             |
| 00275          | TMS           | LMR400        | n/a           | 25m Cable                   | COU             | n/a                  | COU             |
| 00276          | TMS           | LMR400        | n/a           | 4m Cable                    | COU             | n/a                  | COU             |
| 00278          | TILE          | 34G3          | n/a           | TILE Test Software          | NCR             | n/a                  | NCR             |

NCR: No Calibration Required

COU: Calibrate On Use

## APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

### CISPR 16-4 Measurement Uncertainty ( $U_{LAB}$ )

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of  $k=2$

#### Radiated Emissions 30MHz - 200MHz

$U_{LAB} = 5.14\text{dB}$     $U_{CISPR} = 6.3\text{dB}$

#### Radiated Emissions 200MHz - 1000MHz

$U_{LAB} = 5.90\text{dB}$     $U_{CISPR} = 6.3\text{dB}$

#### Radiated Emissions 1GHz - 6GHz

$U_{LAB} = 4.80\text{dB}$     $U_{CISPR} = 5.2\text{dB}$

#### Radiated Emissions 6GHz - 18GHz

$U_{LAB} = 5.1\text{dB}$     $U_{CISPR} = 5.5\text{dB}$

#### Power Line Conducted Emissions 9kHz to 150kHz

$U_{LAB} = 2.96\text{dB}$     $U_{CISPR} = 3.8\text{dB}$

#### Power Line Conducted Emissions 150kHz to 30MHz

$U_{LAB} = 3.12\text{dB}$     $U_{CISPR} = 3.4\text{dB}$

If the calculated uncertainty  $U_{lab}$  is **less** than  $U_{CISPR}$  then:

- |   |                                                                                                           |
|---|-----------------------------------------------------------------------------------------------------------|
| 1 | Compliance is deemed to occur if <b>NO</b> measured disturbance exceeds the disturbance limit             |
| 2 | Non-Compliance is deemed to occur if <b>ANY</b> measured disturbance <b>EXCEEDS</b> the disturbance limit |

If the calculated uncertainty  $U_{lab}$  is **greater** than  $U_{CISPR}$  then:

- |   |                                                                                                                                                    |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | Compliance is deemed to occur if <b>NO</b> measured disturbance, increased by ( $U_{lab} - U_{CISPR}$ ), exceeds the disturbance limit             |
| 4 | Non-Compliance is deemed to occur if <b>ANY</b> measured disturbance, increased by ( $U_{lab} - U_{CISPR}$ ), <b>EXCEEDS</b> the disturbance limit |

### Other Measurement Uncertainties ( $U_{LAB}$ )

#### RF Conducted Emissions 9kHz - 40GHz

$U_{LAB} = 1.0\text{dB}$     $U_{CISPR} = \text{n/a}$

#### Frequency/Bandwidth 9kHz - 40GHz

$U_{LAB} = 0.1\text{ppm}$     $U_{CISPR} = \text{n/a}$

#### Temperature

$U_{LAB} = 1^{\circ}\text{C}$     $U_{CISPR} = \text{n/a}$

## END OF REPORT

**APPENDIX I– RADIATED TX EMISSIONS MEASUREMENT PLOTS**

**APPENDIX J– RADIATED RX MEASUREMENT PLOTS**